



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/797,046

03/11/2004

Jung-hyun Lee

030681-634

4688

21839 7590 02/15/2008  
BUCHANAN, INGERSOLL & ROONEY PC  
POST OFFICE BOX 1404  
ALEXANDRIA, VA 22313-1404

EXAMINER

NADAV, ORI

ART UNIT

PAPER NUMBER

2811

NOTIFICATION DATE

DELIVERY MODE

02/15/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/797,046	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> Ori Nadav	<b>Art Unit</b> 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 22 and 23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22 and 23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/12/07</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (6,844,604), Yeo et al. (6,936,881) or Conley Jr. et al., all in view of Chang et al. (3,996,021) and Seidl et al. (2002/0014647).

Lee et al. teach in figure 1 and related text a capacitor of a semiconductor device (column 2, lines 66-67), the capacitor comprising:

- a lower electrode;
- an  $\text{AlO}(\text{Al}_x\text{O}_y)$  film formed on the lower electrode;
- an upper electrode formed on the AIO film; and
- a dielectric film having a dielectric constant that is higher than that of the AIO film between the upper electrode and the AIO layer,

wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (column 2, lines 66-67).

Yeo et al. teach in figure 4 and related text a capacitor of a semiconductor device, the capacitor comprising:

- a lower electrode;

Art Unit: 2811

an  $\text{AlO}(\text{Al}_x\text{O}_y)$  film formed on the lower electrode;  
an upper electrode formed on the AIO film; and  
a dielectric film having a dielectric constant that is higher than that of the AIO film between the upper electrode and the AIO layer,  
wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (column 9, lines 18-22).

Conley, Jr. et al. teach in figure 5d and related text a capacitor of a semiconductor device, the capacitor comprising:

a lower electrode;  
an  $\text{AlO}(\text{Al}_x\text{O}_y)$  film formed on the lower electrode;  
an upper electrode formed on the AIO film; and  
a dielectric film having a dielectric constant that is higher than that of the AIO film between the upper electrode and the AIO layer,  
wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (abstract).

Lee et al., Yeo et al. and Conley, Jr. et al. do not teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film.

Chang et al. teach using an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film instead of AIO film (column 6, lines 33-50).

Seidl et al. teach in figure 1 and related text a capacitor comprising a lower electrode, an  $\text{AHO}((\text{Al}_x\text{Hf}_{1-x})\text{O}_y)$  film formed on the lower electrode, and an upper electrode formed on the AHO film.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the AIO film in Lee et al., Yeo et al. and Conley, Jr. et

Art Unit: 2811

al.'s device with an AHO( $(\text{Al}_x, \text{Hf}_{1-x})\text{O}_y$ ) film in order to improve the device characteristics.

The combination is motivated by the teachings of Chang et al. who point out the advantages of using an AHO( $(\text{Al}_x, \text{Hf}_{1-x})\text{O}_y$ ) film instead of AIO film (column 6, lines 33-50).

Regarding the claimed imitations of lower and upper electrodes, these features are inherent in Lee et al.'s device, because a capacitor must include lower and upper electrodes. Seidl et al. is also cited to teach a capacitor comprising a lower electrode and an upper electrode.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., Yeo et al. or Conley Jr. et al., and Chang et al. and Seidl et al., as applied to claim 22 above, and further in view of Chooi et al. (6,486,080).

Lee et al., Yeo et al. or Conley Jr. et al., and Chang et al. and Seidl et al. teach substantially the entire claimed structure, as applied to claim 22 above, except an oxidation barrier film formed between the lower electrode and the AHO layer.

Chooi et al. teach an oxidation barrier film formed between the lower electrode and the AHO layer (column 2, lines 16-20).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an oxidation barrier film formed between the lower electrode and the AHO layer in prior art's device, in order to improve the device characteristics, .

***Response to Arguments***

Applicant's arguments with respect to claims 22 and 23 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

O.N.  
2/15/2008

/ORI NADAV/  
PRIMARY EXAMINER  
TECHNOLOGY CENTER 2800